

Vance. (R. A.)

THE
PHYSICAL DIAGNOSIS
OF
BRAIN DISEASE.

BY
REUBEN A. VANCE, M.D.,

PHYSICIAN-IN-CHIEF TO THE NEW YORK INSTITUTE FOR THE PARALYZED AND EPILEPTIC, ETC.



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EDITED BY

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Physician-in-Chief to the New York Institute for the Paralyzed and Epileptic; Late Attending Physician for Nervous Diseases at the Out-Door Department of Bellevue Hospital, and Assistant Physician to the New York State Hospital for Diseases of the Nervous System;
Member of the East River Medical Association, of the Medico-Legal Society, of the Medical Society of the County of N. Y.,
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THE PHYSICAL DIAGNOSIS OF BRAIN DISEASE.

(Extracts from a paper on "The Premonitory Symptoms of Apoplexy," read before the Medical Journal and Library Association, April 28, 1871.)

IN determining the existence of any cerebral morbid process, especially that peculiar state of irritation which precedes the development of apoplectic symptoms, we have to employ physical means of research. In the diagnosis of brain diseases as well as of pulmonary diseases, we can employ instruments which increase the sensibility of our own sense organs, and by so doing recognize alterations which would otherwise pass unnoticed, and determine the existence of disease at an earlier date than is otherwise possible. These instruments are the *æsthesiometer*, the *dynamometer*, the *thermometer*, and the *ophthalmoscope*. The first enables us to interrogate the common sensation of the integument and its sensibility to pain, and, by a comparison of the two sides of the body, to discover any alterations due to pathological causes; while with the second we can pursue the same course in regard to the muscular power. The thermometer affords a ready means of accurately determining local variations of temperature, thus correcting or verifying conclusions arrived at by the rougher method of judging from our own sensations. The ophthalmoscope enables us to appreciate the condition of the retinal circulation, and, inferentially, that of the brain; to observe its increase and decrease under different physiological conditions and from

various pathological causes ; while, by permitting an easy examination of the optic nerves and retinal structures, we are enabled, in certain cases, to form accurate judgments of organic alterations in the brain substance.*

The connecting nervous threads which run from the peripheral expansions of gray matter, constituting the sensory endowments of the skin, to the primary nuclei in the spinal cord, must in some manner be connected with the cortical layer in the cerebral lobes, otherwise it would be impossible for us to become conscious of the sensations which it is their function to convey. It is probable that this connection is made by secondary fibres, running from the spinal nuclei to the sensory-motor ganglia at the base of the brain, and that from these latter other fibres are developed which place the investing gray matter of the cerebral hemispheres in immediate communication with the corpora striata and the optic thalami. The fact that the primary fibre from the integument to the cord terminates in the gray matter of the latter, and that in the other steps of the series communication is established through the connection of these nerve-centres, does not invalidate the statement that there is a direct connection between the periphery and the supreme centres, although it renders it doubtful if this communication is made by one uninterrupted nerve-thread.

The statement in regard to the connection between the superficial gray matter of the cerebrum and the peripheral expansions of nervous tissue which endow the integument with common sensation and the sensibility to pain, is equally true in relation to the cerebral lobes and the motor nerves of muscles. An uninterrupted communication between the supreme centres and the contractile organs is necessary for the conscious performance of voluntary muscular acts. Yet this communication may be, and doubtless is, affected by the intervention of a number of secondary centres and fibres.

Thus, in the nervous system, we have a structure which presents externally various apparatuses which reveal the changes going on within the cerebral organs. Excluding those symptoms which can be produced by local causes, and considering only those which are excited by encephalic dis-

* Vance: "The Ophthalmoscope in the Treatment of Epilepsy."—*New York Medical Journal*, February, 1871.

turbance, we shall devote our attention, first, to the manner in which these symptoms and signs are to be recognized, and then consider the cerebral changes which precede attacks of apoplexy, with special reference to the physical signs they originate.

In the employment of the æsthesiometer and dynamometer, as in the employment of the stethoscope, we seek to compare the results obtained on one side of the body with those obtained on the other side. In examining the respiratory organs, our diagnosis of disease depends upon the presence of signs on one side which do not exist on the other, and which experience has demonstrated to be no part of the phenomena of a healthy lung. In the use of the dynamometer and æsthesiometer, we pursue precisely the same course. The stethoscopic signs from which we arrive at the conclusion that a patient is suffering from consumption are in no sense specific, but can be produced by consolidation of the lung-tissue from any cause whatever. By auscultation and percussion, we are informed as to the density of the lung-substance, the presence or absence of liquid within the air-vesicles and bronchial tubes, and the existence of exudation between the surfaces of the pleuræ—anatomical conditions which can be produced by many different pathological processes. The history of the case and our knowledge of pathology alone furnish us the basis for saying that in the one case the consolidation is due to a tubercular deposit, and in the other to a simple inflammation.

The physical signs which we can appreciate by these two instruments may, in like manner, be due to many different anatomical conditions of the cerebro-spinal system.* The anæsthesias and partial paralyses that we take cognizance of by their aid, like the peculiar sounds heard with the stethoscope, are not specific of any particular morbid process, but simply denote a certain amount of cerebral impairment. In cerebral as in pulmonary diagnosis, we are compelled ultimately to appeal to the clinical history and pathology of a case before we can pronounce an opinion as to its nature, it matters not how much information physical signs may afford as to the situation and extent of the morbid process.

* Vance: "The Early Symptoms of Cerebral Disease."—*Michigan University Medical Journal*, July, 1871.

For some time past, I have recorded many observations in which I have employed these instruments for the purpose of determining the comparative sensibility and motor power of the two sides of the body in individuals who were entirely free from cerebral disease. My object has been to construct a basis from which it would be safe to start in the more accurate investigation of the physical signs presented in those cases of brain disease which were passing under my observation. The results obtained can be summarized by saying that, while well-marked differences exist in the muscular power of the two sides, which, as we should readily imagine, is most developed on the *right* side of the body, the sensibility of the integument is nearly alike at similar situations on the two lateral halves of the body, the difference, where such exists, being in favor of the *left* side. The general rule is, that, while motor power, as determined by the dynamometer, is greater on the right side by about one-sixth, the power of appreciating differences of contact, as determined by the æsthesiometer, is greater on the left side in about the same proportion. An example will illustrate this: An individual can mark 30° with the dynamometer when compressed with the left hand, but when used with the right the needle indicates 35. In this case, the relative difference in strength is indicated by the difference between the markings obtained by the two hands—the right exceeds the left 5° . When the æsthesiometer is employed, it is found that, while the points of the instrument separated to the extent of ten lines are appreciated as two separate and distinct points when applied to the left hand, they will have to be opened at least two lines further to produce the same sensation at a corresponding part of the right hand. In other words, in this case—and it is a fair illustration of all such examinations in health—the sensibility of the left side exceeds that of the right in about the same proportion that the muscular power of the latter exceeds that of the former.

From this it will be seen that the differences between the two sides, although so great as to prevent accurate results being obtained by the use of either instrument singly, yet, when they are employed conjointly, mutually neutralize each other. The excess of sensibility on the left side is

counterbalanced by the greater muscular power of the right side, and *vice versâ*. I have not had sufficient opportunities for observation with left-handed individuals to permit me to state what the rule is in such cases. For all practical purposes, we may call the nervous endowments of the two sides alike in health, and from this basis make our observations in disease.

The pathological process which, in the majority of cases, precedes the development of apoplectic symptoms, is due to an altered relation between the tissues and the blood. With the exception of cases of embolism, it is probable that some condition of this kind is present in all cases of apoplexy. Whatever the essential nature of this process may be, the state of the cerebral circulation is, beyond all doubt, a factor of the utmost importance. This varies in different cases from well-marked anæmia to extreme hyperæmia. Although the symptoms experienced may be similar in both class of cases, yet the treatment required in each is widely different.

The symptoms which precede an apoplectic attack vary widely in different cases. The presence of certain of these symptoms at one time, and their absence at another, are doubtless due to the increase and diminution of this pathological process within given areas of the brain-substance. To the fact that in the one case the sensory tract may be implicated alone, while in others this process may invade the motor tract or the supreme centres, are due those curious cases in which the premonitory symptoms may be limited to disorders of sensibility, motion, or intellection alone. This process, again, may be so generally distributed as to affect all those centres to an equal degree, in which case the symptoms will partake of all these different characters.

Whatever the character of the symptoms produced, whether limited to the intellectual faculties or generally diffused over the sensory or motor powers of the individual, it is a matter of the utmost importance to determine the condition of the encephalic organs, and to adopt proper treatment. The difficulties of sleep and dreams; the illusions and hallucinations of sight, hearing, touch, taste, and smell; the faltering voice and feeble limbs, as well as the

confusion of thought, vertigo, headache, and actual delusions which these cases present, are due to cerebral conditions which our instruments enable us to appreciate, and which our remedies can control. To recapitulate:

1. The thermometer indicates local variations of temperature. In some cases of nervous disorder, Dr. Brown-Séquard says that the difference between the two sides may exceed 12° .

2. The dynamometer registers the comparative strength of the two sides, and in cases of disease determines the side of the brain in which it exists with the greatest intensity.

3. In like manner, the æsthesiometer indicates the comparative sensibility of the two lateral halves of the body, and affords like information as to the site of the cerebral disease.

4. The ophthalmoscope enables us to demonstrate the condition of the cerebral circulation, and thus to discover the immediate cause of the brain symptoms. In the vast majority of cases, this will be a state of hyperæmia. In some, however, anæmia will be the cause. In certain cases, local extravasations of blood can be seen in the retinal structures, together with very intense congestion. Should organic disease be present, it, in the majority of instances, will be indicated by structural changes in the optic disc of the side on which it exists.

124 EAST 27TH STREET, NEW YORK CITY.

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OF

PARALYSIS

BY

Hypodermic Injections of Strychnia.

BY

REUBEN A. VANCE, M.D.,

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